SECTION 16140

WIRING DEVICES

PART 1 GENERAL

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**Edit 1.1 to match Project requirements.**

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1.1 SECTION INCLUDES

A. Receptacles.

B. Switches.

C. Dimmers

D. Wall plates.

E. Multi-outlet assemblies.

1.2 SUBMITTALS

A. Submit the following in accordance with the requirements of Section 01300:

1. Catalog data for each type of wiring device, including data proving that materials comply with specified requirements.

2. Catalog data for each type of device plate, including data proving that materials comply with specified requirements.

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**Edit 1.3 to match Project requirements.**

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1.3 COORDINATION

A. Match devices to plug connectors for LANL furnished equipment.

B. Match cord and plug sets to equipment requirements.

1.4 QUALITY ASSURANCE

A. Conform to requirements of ANSI/NFPA 70 — *National Electrical Code*.

B. Furnish products listed and labeled by Underwriters Laboratories, Inc. for their applications and installation conditions and for the environments in which installed.

PART 2 PRODUCTS

2.1 STRAIGHT-BLADE AND LOCKING TYPE RECEPTACLES

A. Provide back and side wired, screw pressure terminal, straight-blade and locking type, receptacles as indicated on the Drawings. Receptacles shall meet the performance and design requirements of NEMA Standard WD 1— *General Purpose Wiring Devices*, Federal Specification W-C-596F and UL Standard 498 — *Electrical Attachment Plugs and*

*Receptacles*. Receptacle configurations shall be in accordance with NEMA WD 6.

B. For general purpose 120 volt convenience receptacles provide straight-blade NEMA 5-20R, 20 amperes, 125 volts, grounding, duplex receptacles with grey face. Receptacle mounting strap, ground terminal, and ground contacts shall be formed from one piece of brass alloy. Manufacturer: Hubbell “5362GRY”, Arrow Hart “5362GRY”, Pass & Seymour “5362-AGRY”.

C. For computer or instrument 120 volt circuit receptacles provide straight-blade NEMA 5-20R, 20 amperes, 125 volts, isolated grounding, duplex receptacles with grey face and orange triangle. Manufacturer: Hubbell “IG5362GRY”

D. For ground fault circuit interrupter (GFCI) receptacles provide straight-blade NEMA 5-20R, 20 amperes, 125 volts, grounding, “feed through” type GFCI, duplex receptacle with grey face that meet the requirements of UL Standard 943 — *Ground Fault Circuit Interrupters*. Provide units that can be installed in a 2-3/4-inch deep outlet box without an adapter. Manufacturer: Hubbell “GF5362GY”

E. For 120 volts, 20 amp circuit receptacle outlet serving an electric water cooler (EWC), provide straight-blade NEMA 5-20R, 20 amperes, 125 volts, grounding, single receptacle with grey face. Receptacle mounting strap, ground terminal, and ground contacts shall be formed from one piece of brass alloy. Manufacturer: Hubbell “5361GRY”

F. Provide straight-blade and twist lock receptacles for special applications as indicated on the Drawings.

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**Edit 2.2 to match Project requirements.**

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2.2 RECEPTACLES, INDUSTRIAL HEAVY DUTY

A. For 20, 30, 60, and 100 ampere heavy duty splashproof or watertight receptacle outlets, provide pin and sleeve type receptacles that are color coded and configures to the particular circuit voltage and current rating.

B. Pin and sleeve receptacles shall be listed to UL Standard 498 - *Electrical Attachment Plugs and Receptacles* and UL Classified to IEC Standards 309-1 and 309-2 - *Plugs, Socket Outlets, and Couplers for Industrial Purposes*, and Series II rated for voltages and services.

C. Provide a back box suitable for each particular receptacle device and installation location.

D. Where indicated on the Drawings, provide 20, 30, 60, and 100 ampere pin and sleeve receptacles with safety interlocks that will prevent making or breaking the receptacle connection under load.

E. For each receptacle provide a matching plug.

F. Manufacturer: Arrow Hart “Series 309".

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**Edit 2.3 to match Project requirements.**

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2.3 RECEPTACLES IN HAZARDOUS (CLASSIFIED) LOCATIONS

Provide receptacles for hazardous locations, as indicated on the Drawings, that comply with the performance and design requirements of NEMA Standard FB 11 — *Plugs, Receptacles, and Connectors of the Pin and Sleeve Type for Hazardous Locations* and UL Standard 1010 — *Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations*.

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**Edit 2.4 to match Project requirements.**

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2.4 PENDANT/CORD CONNECTOR DEVICES

A.. Provide matching, locking type, plug and plug receptacle body connector, NEMA L5-20P and L5-20R, heavy-duty grade for pendant cords as indicated on the Drawings.

B. Bodies shall be nylon or polycarbonate with screw-open cable-gripping jaws and provision for attaching an external cable grip.

C. External cable grips shall be woven wire mesh type made of high-strength galvanized-steel wire strands, matched to cable diameter and with attachment provision designed for the corresponding connector.

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**Edit 2.5 to match Project requirements.**

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2.5 CORD AND PLUG SETS

A. Provide cord and plug sets that match voltage and current ratings and number of conductors to requirements of the equipment being connected.

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**Edit B. to match Project requirements. Refer to LANL Electrical Engineering Standards part 216 for guidance.**

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B. Cord shall be [600] [300] volt insulated, stranded copper conductors, with type [SO] [SOO] [SEO] [STO] [SJO] [SJOO] [SJEO] [SJTO] [G] [W] jacket and rated for [105 degree C] [90 degree ºC]. Grounding conductor not less than that required in Table 250-95 of ANSI/NFPA 70 and shall have green insulation. Conductor ampacity shall be equipment rating plus 25 percent minimum.

C. Plug shall be male configuration with nylon or polycarbonate body and integral cable-clamping jaws. Match to cord and to receptacle type intended for connection.

D. Provide horsepower rated twist-lock cord and plug sets to connect small motors as follows; cord length shall not exceed 36 inches:

1. Up to 1/2 HP, 120V, single phase: NEMA L5-15 receptacle/plug with 3 No. 14 AWG conductor cord.

2. Up to 1 HP, 120V, single phase: NEMA L5-20 receptacle/plug with 3 No. 12 AWG conductor cord.

3. Up to 3 HP, 200/230V, three phase: NEMA L15-20 receptacle/plug with 4 No. 12 AWG conductor cord.

4. Up to 5 HP, 200/230V, three phase: NEMA L15-30 receptacle/plug with 4 No. 10 AWG conductor cord.

5. Up to 10 HP, 460V, three phase: NEMA L16-20 receptacle/plug with 4 No. 12 AWG conductor cord.

2.6 WALL SWITCHES

A. Provide single pole, double pole, three-way, four-way and illuminated handle wall switches as indicated on the Drawings.

B. Switch shall be rated 20 ampere, 120-277 volt AC, back and side wired, screw pressure terminal, quiet type AC switch with grey handle and yoke grounding screw. Switches shall meet the performance and design requirements of NEMA Standard WD 1— *General Purpose Wiring Devices*, Federal Specification WS-896E and UL Standard 20 — *General Use Snap Switches*.

C. Manufacturer: Hubbell “HBL1220GY” series

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**Edit 2.7 to match Project requirements.**

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2.7 WALL SWITCHES IN HAZARDOUS (CLASSIFIED) LOCATIONS

A. Provide wall switches for hazardous locations, as indicated on the Drawings, that comply with UL Standard 894 — *Switches for Use in Hazardous (Classified) Locations.*

B. Switch shall be rated 20 ampere, 120-277 volt AC, and shall meet the performance and design requirements of NEMA Standard WD 1— *General Purpose Wiring Devices*, Federal Specification WS-896E and UL Standard 20 — *General Use Snap Switches*.

C. Manufacturer: Appleton “EDS”.

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**Edit 2.8 to match Project requirements.**

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2.8 DIMMER SWITCHES

A. Provide modular full-wave solid-state dimmer switch units with integral, quiet on-off switches, and audible and electromagnetic noise filters.

B. Dimmer wattage rating shall exceed connected load by 30 percent minimum, except as otherwise indicated.

C. Control shall be by continuously adjustable slide, toggle or rotary knob. Provide single-pole or 3-way switch to suit connections.

D. Provide incandescent lamp dimmers as indicated on the Drawings. Equip dimmers with electromagnetic filter to eliminate noise, RF and TV interference. Provide dimmer with a grey faceplate. Manufacturer: Lutron “Nova”

E. Provide fluorescent lamp dimmers for use with electronic ballasts specified in Section 16510, INTERIOR LIGHTING SYSTEM. Provide dimmer with a grey faceplate. Manufacturer: Lutron “Nova”

2.9 WALL PLATES

A. For flush mounted interior receptacles and wall switches, provide 0.04 inch thick brushed 302/304 alloy stainless steel smooth wall plates that meet the requirements of Federal Specification WP-455A. Manufacturer: Hubbell “S” series.

B. For surface mounted interior receptacles and switches, furnish galvanized steel 4 inch square raised surface covers. Receptacles installed in raised covers shall be secured by more than

one screw. Manufacturer: RACO “800" series.

C. For GFCI receptacles in damp or wet locations, provide weatherproof, cast aluminum, hinged, self-closing device cover. Manufacturer: Hubbell “RCV1-GFR” or “RCH1-GFR”

D. Provide single and combination type wall plates that mate and match with corresponding wiring devices.

E. Use metal plate-securing screws to match plate finish.

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**Edit 2.10 to match Project requirements.**
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2.10 MULTI-OUTLET ASSEMBLIES

A. Provide multi-outlet assemblies as indicated on the Drawings. Provide fittings as required for a complete installation.

B. Comply with Standard UL 5, "Surface Metal Raceways and Fittings."

C. Components of assemblies shall be products of a single manufacturer designed to be used together to provide a complete matching assembly of raceways and receptacles.

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**Edit D. to match Project requirements.**
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D. Raceway material shall be [metal with manufacturer's standard corrosion-resistant finish] [stainless steel].

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**Edit E to match Project requirements.**
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E. Receptacles shall be NEMA 5-15R [isolated ground type] spaced 12 inches on center.

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**Edit F to match Project requirements.**
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F. Wiring shall be No. 12 AWG type THHN-THWN, 3-wire with insulated [equipment] [isolated] grounding conductor.

G. Manufacturer: Wiremold, “2000 Plugmold”

PART 3 EXECUTION

3.1 PREPARATION

A. Verify outlet boxes are installed at proper height.

B. Verify wall openings are neatly cut and will be completely covered by wall plates.

C. Verify branch circuit wiring installation is completed, tested, and ready for connection to wiring devices.

D. Clean debris from outlet boxes.

3.2 INSTALLATION

A. Install products following manufacturer's instructions.

B. Install devices plumb, level and secure.

C. Except as otherwise indicated on the Drawings, mount devices flush, with long dimension vertical, and grounding point of receptacles on top. Group adjacent switches under single, multi-gang wall plates.

D. Install ground-fault circuit-interrupter (GFCI) type receptacles at the following locations:

1. Outdoor locations, including roofs.

2. Indoor locations within 6 feet of exterior doors.

3. Laboratory and experiment areas within 6 feet of a sink.

4. Within 6 feet of an emergency shower/eyewash station.

5. Kitchen/break areas within 6 feet of a sink.

6. Bathroom and shower areas.

7. Other locations as indicated on the Drawings.

E. Do not use the duplex/split-wire break-off tabs in receptacles as circuit conductors for connecting downstream devices.

F. Cover devices and assemblies during painting.

G. Install wall plates on switch, receptacle, and blank outlets after painting is complete.

H. Install receptacle for electric water cooler (EWC) within EWC cabinet as recommended by manufacturer.

I. Install galvanized steel plates on outlet boxes and junction boxes in unfinished areas, above accessible ceilings, and on surface mounted outlets.

3.3 GROUNDING

A. Connect wiring device grounding terminal to branch circuit equipment grounding conductor.

B. Connect isolated ground receptacle grounding terminal to the isolated grounding conductor.

3.4 INTERFACE WITH OTHER PRODUCTS

A. Install wall switch and dimmer switch with center 42 inches above finished floor and within 6 inches of door frame. Coordinate with adjacent thermostat outlets so all are at same height and are symmetrically grouped.

B. Install receptacles with center 18 inches above finished floor, unless otherwise indicated on the Drawings. Coordinate with adjacent telecommunications outlets so all are at same height and are symmetrically grouped.

C. Install receptacles above counters and lab benches with center not more than 44 inches above the floor, unless otherwise noted on the Drawings. Coordinate with adjacent telecommunications outlets so all are at same height and are symmetrically grouped.

D. Identify switches, receptacles and wiring according to the provisions of Section 16195, ELECTRICAL IDENTIFICATION.

3.5 FIELD QUALITY CONTROL

A. Inspect each wiring device for defects before installing.

B. Operate each operable device at least six times with circuit energized and verify proper operation.

C. Test receptacles for proper polarity and ground continuity.

D. Test ground-fault circuit interrupter receptacle operation with both local and remote fault simulations according to manufacturer recommendations.

1. Verify that GFCI will trip at 5 ±1 mA current

2. Verify that GFCI does not trip at less than 1.8 mA current.

E. Replace damaged or defective components.

3.6 CLEANING AND ADJUSTING

A. Clean devices and wall plates. Replace stained or improperly painted wall plates or devices.

B. Adjust devices and wall plates to be flush and level.

END OF SECTION